

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BRUCE D. SARTWELL and PAUL M. NATISHAN

Appeal No. 1998-1154
Application No. 08/304,960

ON BRIEF

Before GARRIS, PAK, and WALTZ, Administrative Patent Judges.
WALTZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the examiner's refusal to allow claims 1, 5 and 7 as amended subsequent to the final rejection (see the amendment filed July 29, 1996, Paper No. 13, entered as per the Answer, page 2). Claims 8 through 17, the remaining claims in this application, stand withdrawn from further consideration as being directed to a non-elected invention (Answer, page 2).

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According to appellants, the invention is directed to a method of protecting aluminum substrates from corrosion by implanting a specified ion into aluminum or an aluminum alloy in the presence of molecular oxygen (Brief, page 2). A copy of illustrative independent claim 1 is attached as an Appendix to this decision.

The examiner has relied upon the following references as evidence of obviousness:

Yonezawa et al. (Yonezawa)	4,433,004	Feb. 21,
1984		

Armini et al. (Armini)	5,383,934	Jan. 24,
1995		
(filed Sep. 13, 1993)		

Natishan et al. (Natishan), "Surface Charge Considerations in the Pitting of Ion-Implanted Aluminum," *J. Electrochem. Soc.*, pp. 321-327 (1988).

Claims 1, 5 and 7 stand rejected under 35 U.S.C. § 103 as unpatentable over Yonezawa or Natishan in view of Armini (Answer, page 3). We reverse all of the examiner's rejections on appeal essentially for the reasons stated in appellants' Brief, Substitute Reply Brief (dated Apr. 7, 1997, Paper No. 19), and the reasons below.

OPINION

The examiner finds that Yonezawa teaches treating aluminum alloy surfaces to prevent chemical corrosion due to water with the formation of an alumina surface that contains one additional metal, such as titanium, incorporated by ion implantation (Answer, paragraph bridging pages 3-4). The examiner recognizes that the teachings of Yonezawa differ from the claimed method in "not discussing the conditions present during the possible ion bombardment step" (Answer, page 4).

Similarly, the examiner finds that Natishan teaches ion implantation of certain specified metal ions in the surface of an aluminum substrate to prevent corrosion caused by chloride solutions but doesn't "mention use of molecular oxygen during implantation" (Answer, page 5). Contrary to the claimed method, the examiner finds that Natishan teaches ion implantation at pressures of 0.8 to 2×10^{-6} torr (*id.*), which is described as a "vacuum" (Natishan, page 321, right column, last paragraph).

The examiner attempts to remedy the deficiencies of the primary references to Yonezawa and Natishan by applying Armini for the teaching of implanting zirconium ions in an alloy of titanium while immersed in an oxygen-containing gas with a

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partial pressure between 5×10^{-6} and 1×10^{-3} torr (Answer, page 6). The examiner further finds that Armini specifically discloses a Ti-6Al-4V alloy which is "generally suggestive of titanium aluminum alloys for treatment, ie [sic] metal alloys containing Al as well as Ti." *Id.* The examiner concludes that since Armini has a concern for the prevention of corrosion similar to the primary references, as well as a teaching of producing a protective surface oxide layer, it would have been obvious to one of ordinary skill in the art of protective oxide surface coatings to use the ion implantation technique of Armini, including oxygen-containing gases, with the expectation of analogous desirable results. *Id.*

It is well settled that the initial burden of presenting a *prima facie* case of obviousness rests with the examiner. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). It is also well established that before a conclusion of obviousness can be made based on a combination of references, there must have been a reason, suggestion or motivation to lead an inventor to combine those references. *Pro-Mold and Tool Co. v. Great Lakes Plastics Inc.*, 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1629 (Fed. Cir. 1996). Evidence

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of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved, but the showing must be clear and particular. See *In re Dembiczak*, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999).

Yonezawa is directed to ion implantation of only aluminum alloys, not pure aluminum (see col. 1, ll. 44-46), with metal ions selected from the group consisting of Cu, Mg, Ni, Cr, Mn, Ti or Y (col. 1, ll. 47-48; col. 5, ll. 8-14). Natishan is only directed to ion implantation of pure aluminum (abstract; page 321, right column, last full paragraph) with metal ions selected from the group consisting of Si, Cr, Zr, Nb, Mo, Zn, or Mg (abstract; page 321, left column, third paragraph). In contrast with these two primary references, the secondary reference to Armini is directed to ion implantation of "an alloy primarily consisting of titanium" (col. 2, ll. 8-13) only with zirconium ions (col. 2, ll. 21-27; col. 3, ll. 2-5). Armini specifically teaches that "[t]he workpiece may also be a surgical alloy composed primarily of titanium, such as titanium-6aluminum-4vanadium." See col. 4, ll. 6-8. As

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summarized by the examiner (Supplemental Answer, Paper No. 20, pages 2-3), a main issue to be decided is "whether titanium aluminum alloys are sufficiently analogous to aluminum alloys" that the teachings of Armini can be applied to the methods of the primary references. We determine that the examiner has not presented convincing evidence or reasoning that one of ordinary skill in this art would have applied the oxygen immersion ion implantation of Armini to the aluminum of Natishan or the aluminum alloys of Yonezawa. As appellants have established, the titanium-6aluminum-4vanadium workpiece of Armini is not an aluminum-based alloy within the meaning of the claims on appeal (Brief, page 5; Substitute Reply Brief, page 5). The examiner has not supplied sufficient reasoning or evidence that one of ordinary skill in this art would have applied the teachings of Armini regarding titanium alloys to the aluminum alloys of Yonezawa. Armini teaches that the zirconium and oxygen molecules diffuse into the workpiece and chemically react (col. 2, ll. 28-33). The examiner has not presented any convincing reasoning or evidence that zirconium and oxygen would have been expected to so react with a substrate materially different than the one exemplified by Armini.

Additionally, Armini only teaches ion implantation of zirconium ions with an oxygen background. Yonezawa does not teach that zirconium is an ion that could be implanted in an aluminum alloy (see the abstract). Furthermore, Natishan is only directed to pure aluminum substrates, not alloys, and thus even considering the teachings of Armini analogous for any titanium aluminum alloy would not establish a reason for the combination of these references.

Finally, as appellants argue (Brief, page 5; Substitute Reply Brief, page 4), the examiner has not identified any convincing motivation or reason to combine the references. The examiner finds that all references are concerned with corrosion (Answer, page 6). However, while Yonezawa and Natishan are concerned with corrosion or pitting, Armini only states that "[z]irconium ions have been ion implanted into *iron and steel* to improve the corrosion properties." See col. 1, ll. 53-55, emphasis added. Armini teaches that his invention uses zirconium and oxygen "to form a low-friction surface layer of zirconium oxide." See col. 2, ll. 21-27. Furthermore, Armini teaches that the graded or blended interface of workpiece material and zirconium oxide "is

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beneficial for providing improved adhesion compared to conventional coatings" (col. 2, ll. 55-62). Accordingly, the examiner has not identified with particularity any reason or motivation to combine the references as proposed.

For the foregoing reasons and those set forth in the Brief and Substitute Reply Brief, we determine that the examiner has not presented a *prima facie* case of obviousness in view of the reference evidence. Therefore, the rejection of the claims on appeal under 35 U.S.C. § 103 over Yonezawa or Natishan in view of Armini cannot be sustained.

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The decision of the examiner is reversed.

REVERSED

	Bradley R. Garris)	
	Administrative Patent Judge)	
)	
)	
	Chung K. Pak)	BOARD OF
PATENT	Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
)	
	Thomas A. Waltz)	
	Administrative Patent Judge)	

TAW:tdl

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APPENDIX

1. A method of ion implantation, comprising the steps of:

placing a substrate metal selected from the group consisting of aluminum and aluminum-based alloys in an ion implantation vacuum chamber;

introducing oxygen molecules into the ion implantation vacuum chamber to a pressure in the range of 1×10^{-5} torr to 10×10^{-5} torr; and

directing a beam of ions at the substrate metal, said ion being selected from the group consisting of tantalum ions, titanium ions, zirconium ions, tungsten ions, molybdenum ions, and silicon ions.